LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

BARTHOLOMEW LAKE

WATERBODY EVALUATION & RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

September 2012 - Prepared by

Ryan Daniel, Biologist Manager, District II

Updated February 2015

TABLE OF CONTENTS

WATERBODY EVALUATION **4**

STRATEGY STATEMENT **4**
Recreational *4*
Commercial *4*
Species of Special Concern *4*
EXISTING HARVEST REGULATIONS **4**
Recreational *4*
Commercial *4*
SPECIES EVALUATION **4**
Recreational *4*
Recreational Creel Survey *14*
Commercial *15*
HABITAT EVALUATION **16**
Aquatic Vegetation *16*
Substrate *17*
Available complex cover *17*
Artificial Structure *17*
CONDITION IMBALANCE / PROBLEM **17**
CORRECTIVE ACTION NEEDED **17**
RECOMMENDATIONS **18**

WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational
Sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts.

Commercial
Although species comprising a commercial fishery exist in Bartholomew Lake, no commercial fishing is currently permitted.

Species of Special Concern
No threatened or endangered fish species are found in this waterbody.

EXISTING HARVEST REGULATIONS

Recreational
Statewide regulations are in effect for all fish species.

Commercial
Commercial fish netting is prohibited. Effective September 20, 1991, gill nets, trammel nets, hoop nets, and fish seines were prohibited by legislative statute in conjunction with the implementation of a harvest regulations for black bass. The bass regulations have since been rescinded.

SPECIES EVALUATION

Recreational
Largemouth bass *Micropterus salmoides* are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish. Sampling with gill nets determines the status of large bass and other large fish species. Shoreline seining has been used in the past to collect information related to fish reproduction and forage availability.

Largemouth Bass

Largemouth Bass CPUE and Length Frequency
In the chart below (Figure 1), fall electrofishing data is used as an indicator of largemouth bass relative abundance with total catch-per-unit-of-effort (CPUE) indicated for three size classes since 1991. There appears to be a trend of declining abundance in all three size

classes since 1999. A partial explanation could be the removal of the 14 – 17 inch slot limit in 2000, which allowed for the harvest of fish within this size range. The most recent sample (2013) showed a significantly lower CPUE. Explanations could be a high degree of sampling error and/or the recent change in the available shallow water habitat due to the infestation of hydrilla *Hydrilla verticillata.* The hydrilla could cause fish to orient further from the shoreline or make them difficult to observe while electrofishing in shallow areas. Figure 2 depicts CPUE from spring electrofishing samples over the same period of time. The trend is similar, although not as pronounced. The sharp decline in 2001 could be related to weather conditions during the sample, such as sampling immediately following a cold front or heavy rainfall. Other year to year variability can often be explained by sampling error. Note that the spring 2013 sampling results portray a much higher abundance than the fall. Also, sampling frequency was decreased to every third year after 2001, rather than every other year from 1991 - 2001.

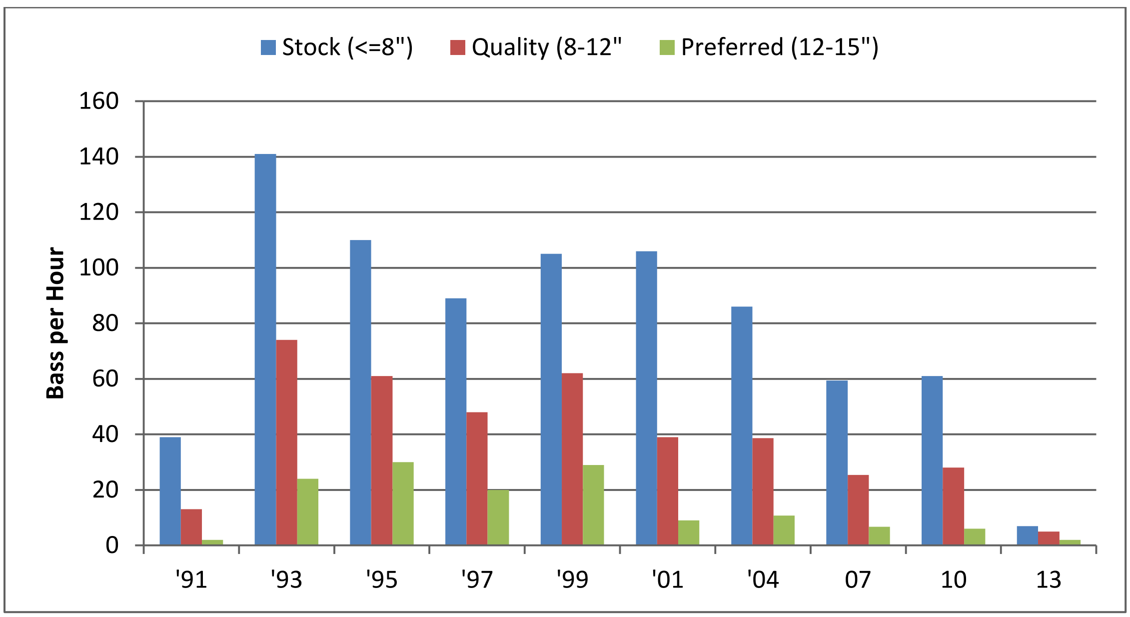

Figure 1. Catch per unit effort (bass per hour) for stock, quality, and preferred-size largemouth bass collected from fall electrofishing samples on Bartholomew Lake, LA, from1991 – 2013.

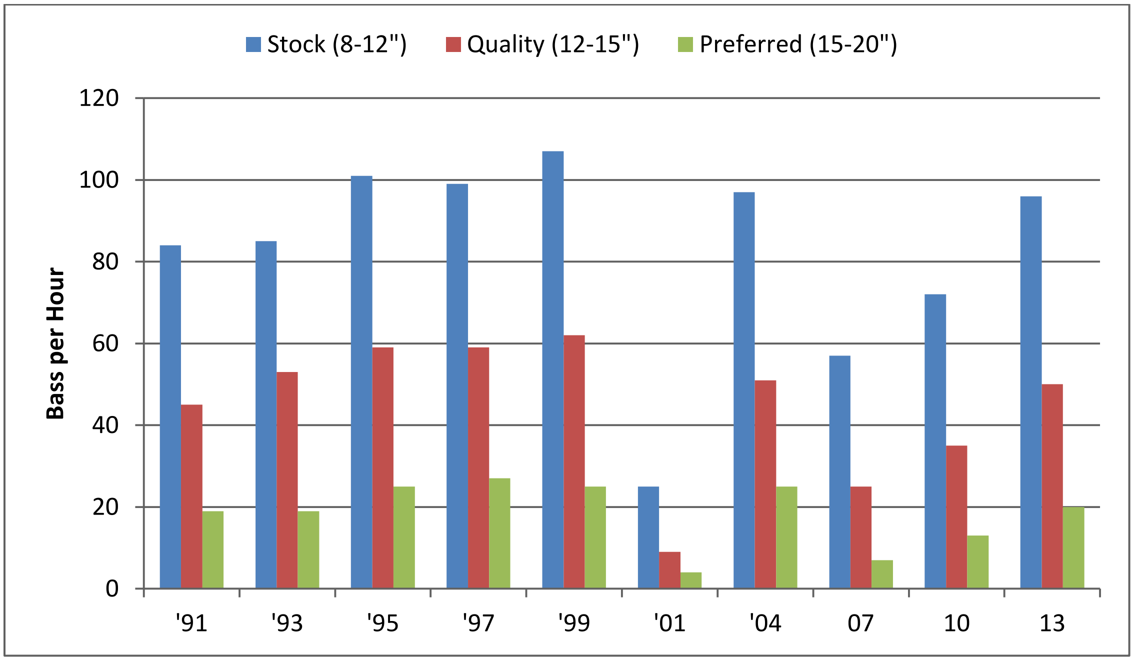

Figure 2. Catch per unit effort (bass per hour) for stock, quality, and preferred-size largemouth bass collected from spring electrofishing samples on Bartholomew Lake, LA from 1991 – 2013.

The following charts (Figures 3, 4, 5, and 6) show length distributions in catch per hour for largemouth bass for the years 2001, 2004, 2007, and 2010, respectively. A fairly balanced population is indicated, in that nearly all of the inch groups from 6 – 18 inches are represented in each sample. However, in all years the most abundant bass in the lake are 10-12". These fish appear to be mostly age 1+ (See Figure 8 below), suggesting a relatively high level of recruitment from the juvenile to sub-adult/adult state. It should be noted that larger bass (> 20 inches) are not efficiently sampled by electrofishing gear and therefore may be under represented in these results.

Relative weight (Wr) for each inch group is also shown. This measurement is obtained from fall samples only and is defined as the ratio of a fish's weight to the weight of a ''standard'' fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass relative weights below 80 may indicate a problem of insufficient or unavailable forage, whereas relative weights closer to 100 indicate sufficient available forage. A description of the forage species and sampling methods is described below. The relative weights depicted in the charts below show that there appears to be abundant forage in Bartholomew Lake.

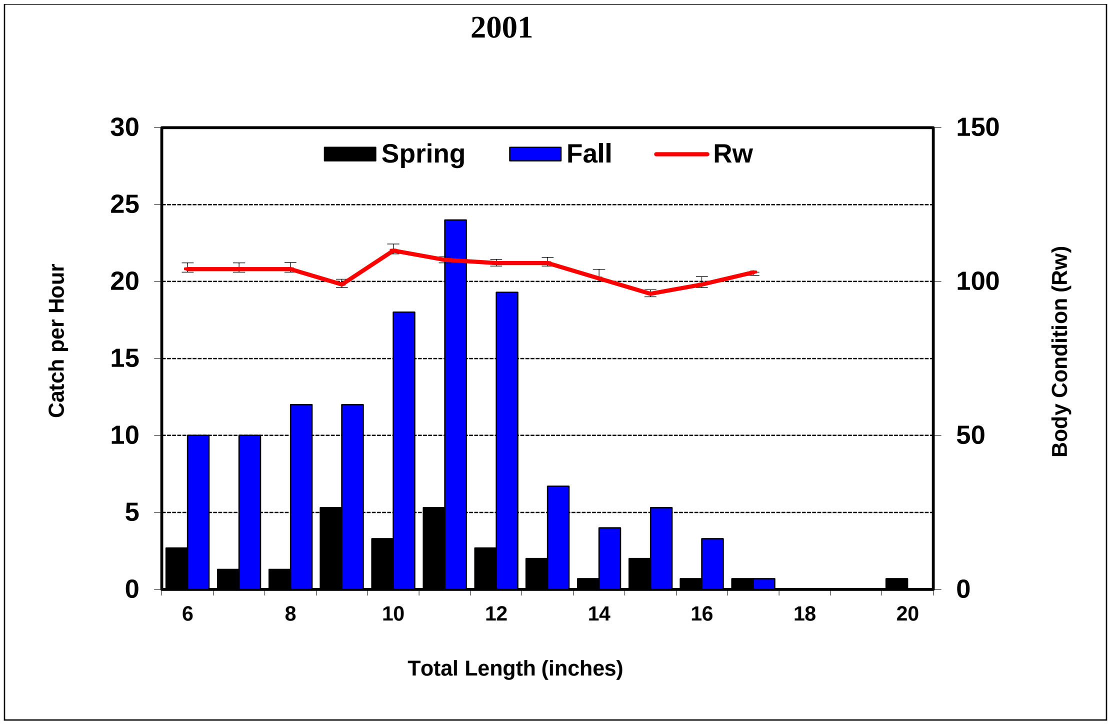

Figure 3. Size distributions (length groups) and condition factors (mean relative weights ±SE) for largemouth bass in Bartholomew Lake, LA, for the year 2001.

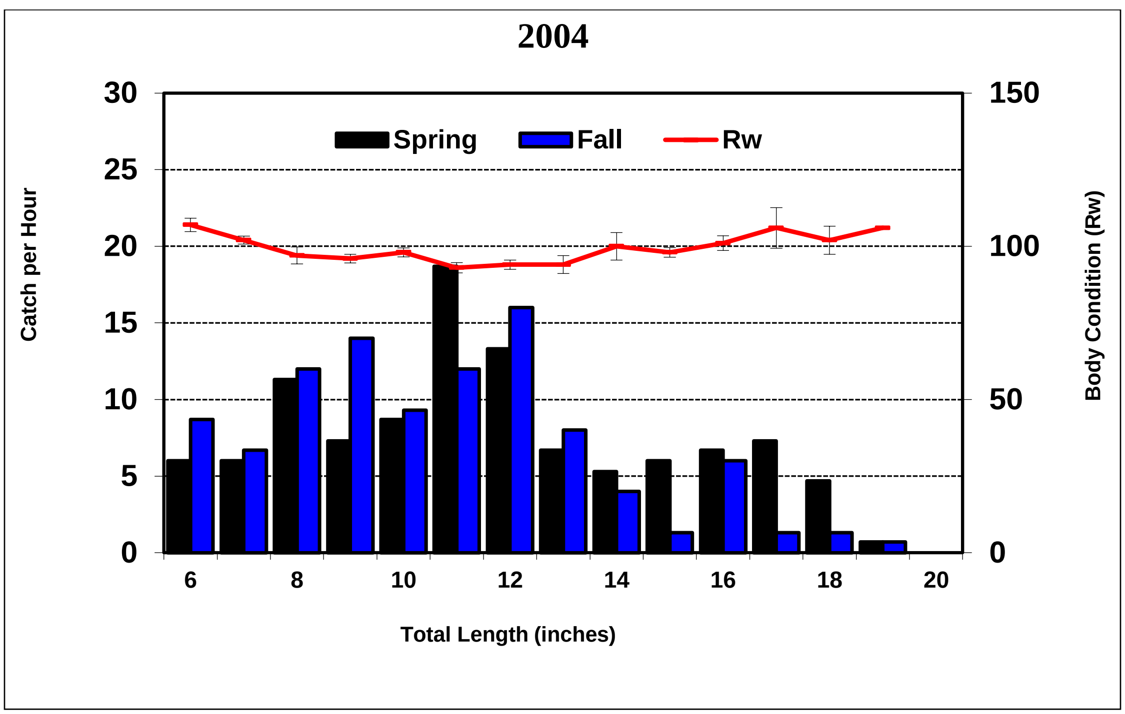

Figure 4. Size distributions (length groups) and condition factors (mean relative weights ±SE) for largemouth bass in Bartholomew Lake, LA, for the year 2004.

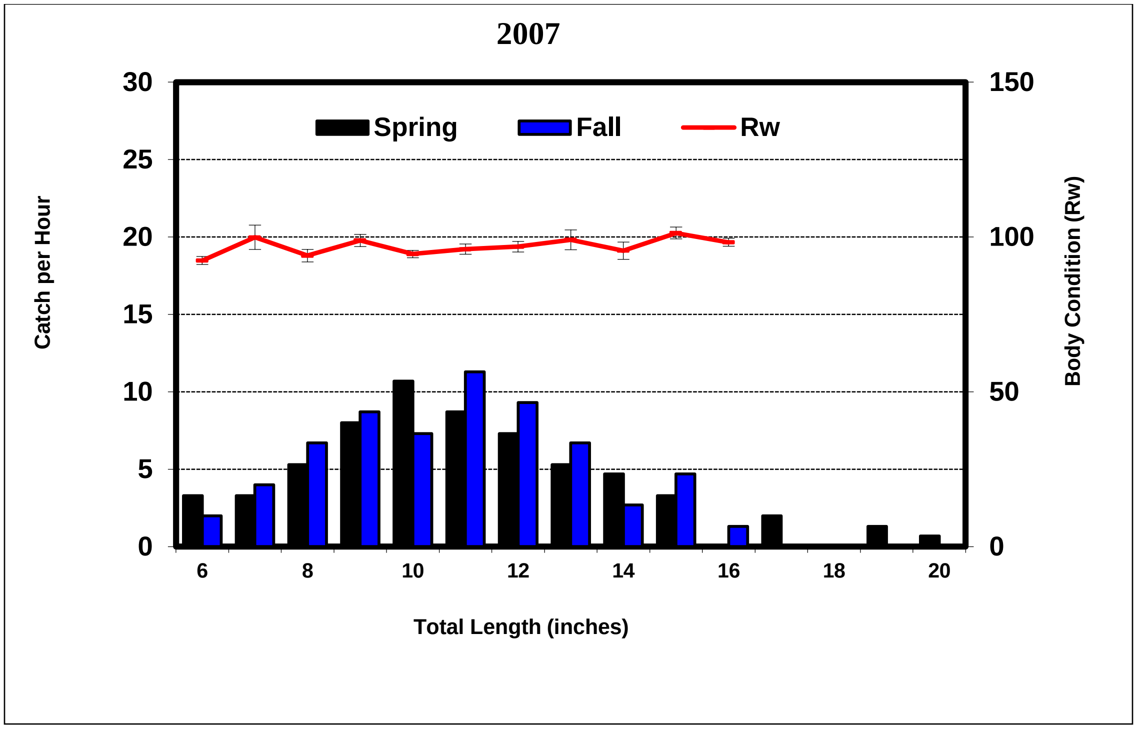

Figure 5. Size distributions (length groups) and condition factors (mean relative weights +SE) for largemouth bass in Bartholomew Lake, LA, for the year 2007.

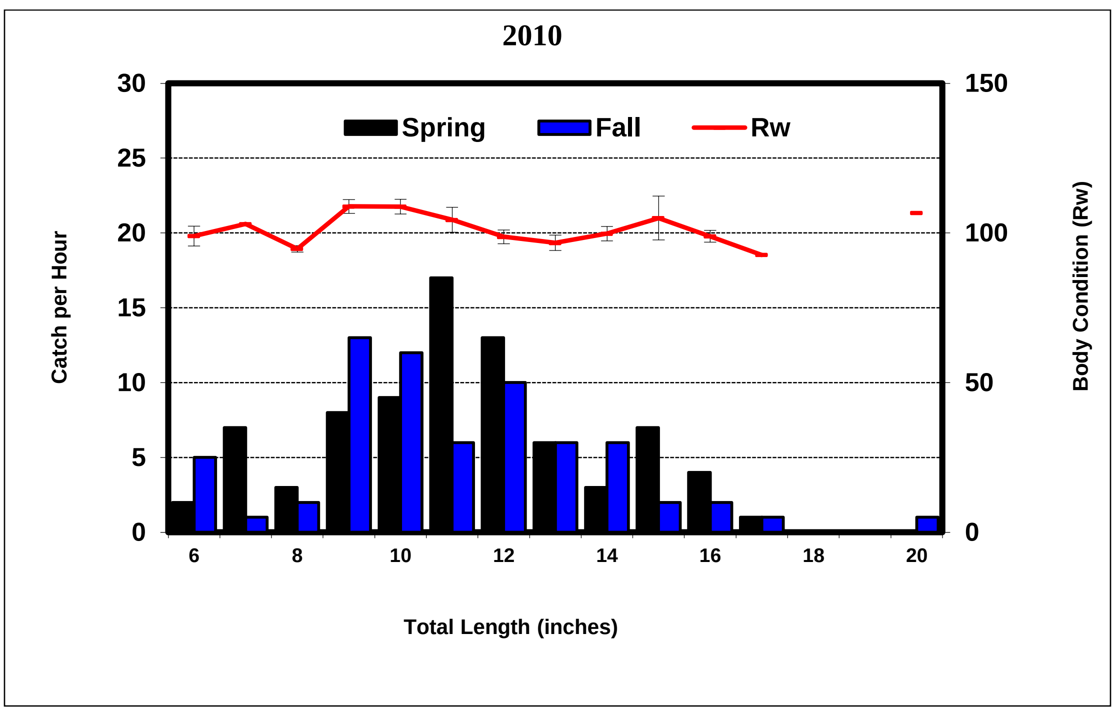

Figure 6. Size distributions (length groups) and condition factors (mean relative weights +SE) for largemouth bass in Bartholomew Lake, LA, for the year 2010.

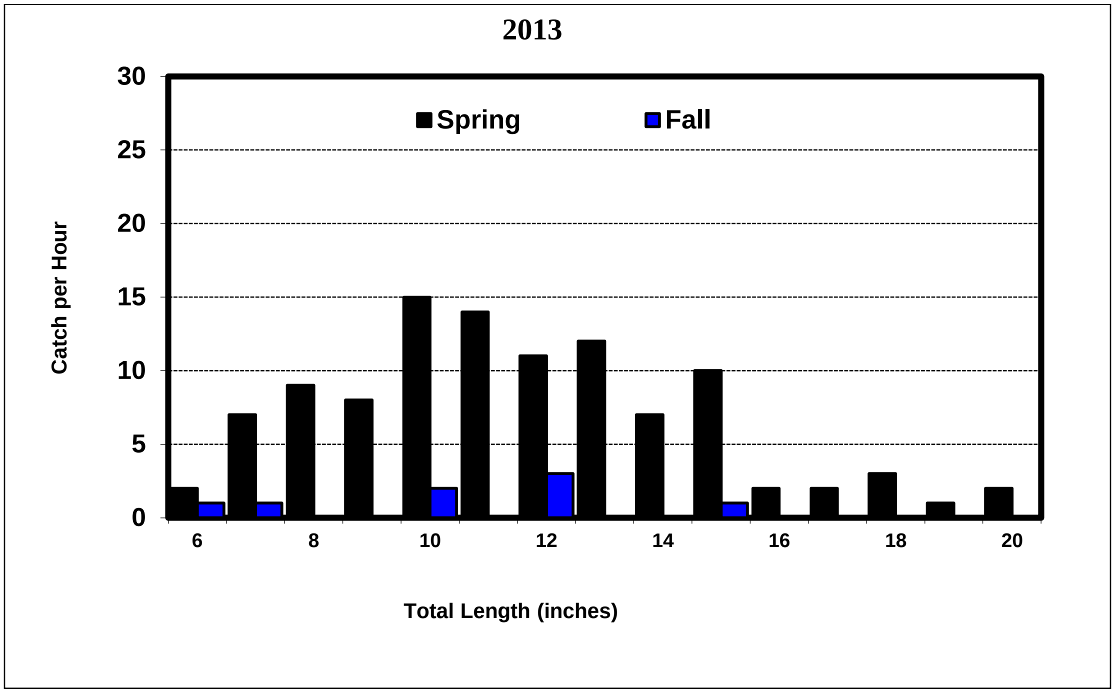

Figure 6. Size distributions (length groups) for largemouth bass in Bartholomew Lake, LA, for the year 2013.

Largemouth Bass Genetics

With the exception of one northern largemouth bass stocking in 1972, Florida largemouth bass *M. floridanus* are the only black bass that have been stocked into Bartholomew Lake. Florida bass are typically stocked into waterbodies which are believed to have the potential (fertility and forage) to grow and produce quality size bass. Stocking was initiated in 1991 and discontinued after 1998. No genetic analysis was performed before this the Florida bass introductions, but it was assumed that the population was comprised of only northern largemouth bass. A genetic sample taken in 1991 did not reveal the presence of the Florida bass in the population. Genetic samples taken in 1994 and 1997 did indicate Florida influence in the largemouth bass population. Samples from 1994 and 1997 were comprised of Florida genetic influence at levels of 18% and 33% respectively. Genetic sampling was also conducted in 2001 and 2004. Analysis revealed the Florida genome to be present in 25% of the fish sampled. Hybrids (Florida x northern) comprised 22% of both samples (Figure 7). Florida bass stockings were discontinued in 1999 and the protected slot limit for bass was removed in 2000. Justification for the change included an insufficient increase in larger bass and low angler participation.

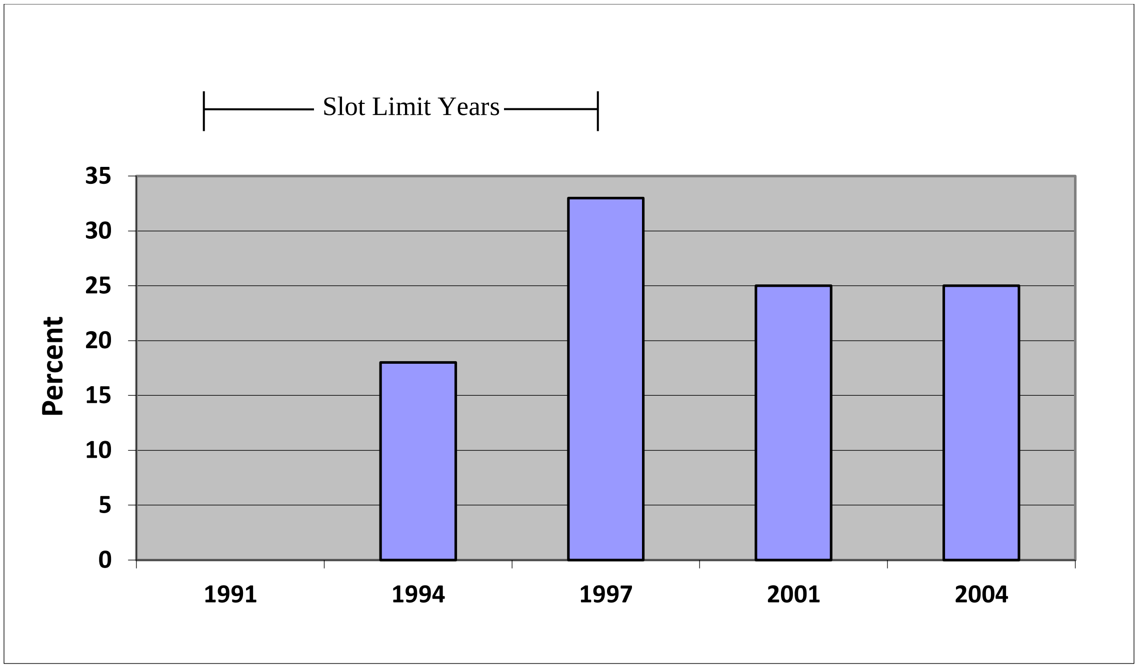

Figure 7. Percentage of Florida bass genome present in largemouth bass populations collected from Bartholomew Lake, LA, in 1991, 1994, 1997, 2001, and 2004.

Largemouth Bass Age and Growth

Age was determined for largemouth bass from fall electrofishing samples taken in 1997, 1999, 2001, and 2004. Mean lengths (mm) at capture for ages 1+ – 4+ are shown in Figure 8. Bartholomew Lake largemouth bass growth is very similar to the statewide average (age 1+ = 262 mm, age 2+ = 335 mm, age 3+ = 384 mm, and age 4+ = 424 mm). Growth appears to have been consistent among cohorts for each sample year. The variability seen in age 4+ fish is most likely due to the small sample sizes of larger fish.

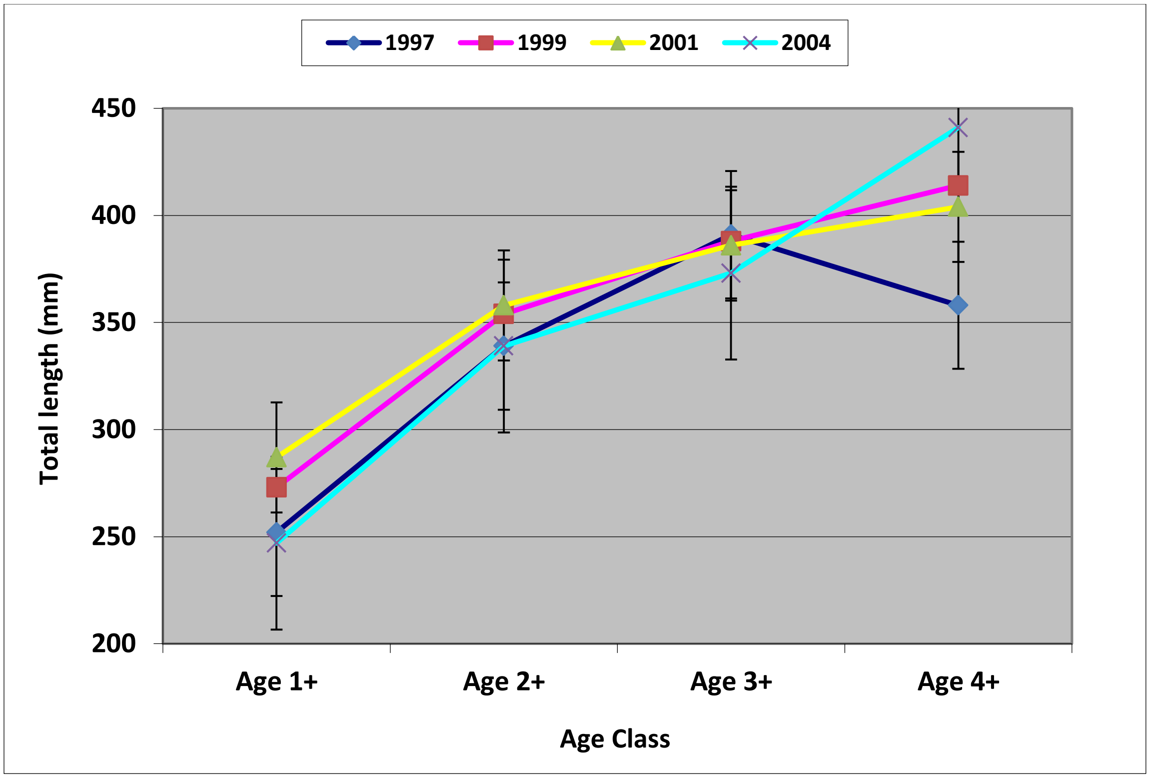

Figure 8. Largemouth bass actual mean lengths (±SE) at age for fall electrofishing samples for ages 1+, 2+, 3+, and 4+ from Bartholomew Lake for years 1997, 1999, 2001 and 2004.

Crappie

Crappies *Pomoxis spp.* had never been specifically targeted for sampling prior to 2013 when lead nets were first utilized in Bartholomew Lake. Both white crappies *P. annularis* and black crappies *P. nigromaculatus*, have been recorded from various sampling gears over the years, including gill netting, electrofishing, and biomass (rotenone) sampling. Catch rates in these samples were not sufficient for conclusions regarding the populations. Biomass (rotenone) sampling conducted in 1987, 1991, 1992, and 1995 showed pounds per acre of black crappie to be 21, 1, 1, and 0, respectively. Results of the 1992 recreational creel survey estimated that crappie anglers harvested 0.4 crappies/hr. and an estimated total of 3,230 crappies were harvested for that year. The 2013 lead net sampling results revealed a normally distributed population, with both black and white crappie represented. Age and growth analysis was not conducted, though it appears at least two or three age classes were represented.

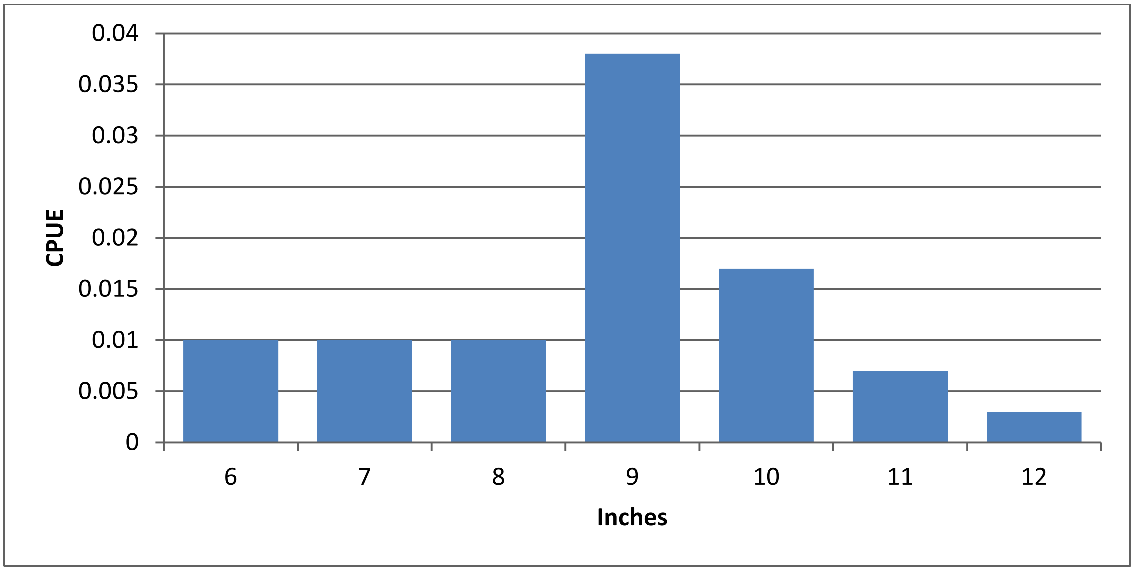

Figure 9. Catch per unit effort (number per hour) of crappie captured during lead net sampling on Bartholomew Lake in 2013.

Forage

Sunfish *Lepomis spp.*, silversides *Atherinidae*, gizzard shad *Dorosoma cepedianum*, threadfin shad *D. petenense*, and cyprinid minnows *Cyprinidae* have been identified as the primary bass forage species in Bartholomew Lake. In addition to calculation of largemouth bass relative weights (described above), forage availability has been measured from biomass (rotenone) sampling and shoreline seining. Figure 10 shows pounds/acre of shad, sunfish, and cyprinids (shiners) obtained during the last four biomass samples conducted on Bartholomew Lake. Shoreline seining in 1990 and 1991 revealed a total of 24 different species of fish which could potentially be utilized as forage.

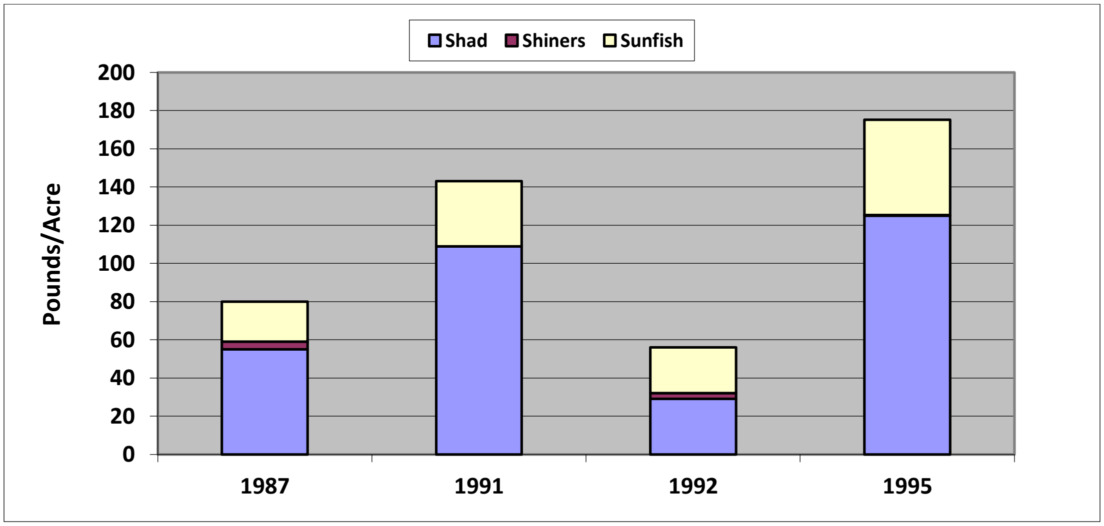

Figure 10. **E**stimates of shad, sunfish, and shiners from biomass samples taken from Bartholomew Lake, LA, in 1987, 1991, 1992, and 1995.

Sunfish

Bluegill *Lepomis macrochirus* and redear sunfish *L. microlophus* are the most abundant sunfish species in Bartholomew Lake. Other species documented from forage and seine samples include longear sunfish *L. megalotis*, dollar sunfish *L. marginatus*, spotted sunfish *L. punctatus*, and warmouth *L. gulosus*. Figure 11 shows the size distributions (total lengths) in CPUE for bluegill and redear sunfish collected during an electrofishing forage sample in fall, 2010. Bluegill was again the dominant sunfish species captured during the electrofishing forage sample of 2013, though redear, longear, and warmouth were also present. The total number of sunfish collected per hour for each species from 1997, 1998, 1999, 2010, and 2013 are shown in Figure 12. Bluegills were much more abundant than redear in each of the samples. The lead net sample results for 2013 also portrayed this, as 265 bluegill were captured, while only 21 redear were caught. The species and length distributions of the sunfish indicate an adequate and balanced forage population, as well as a desirable predator-prey relationship.

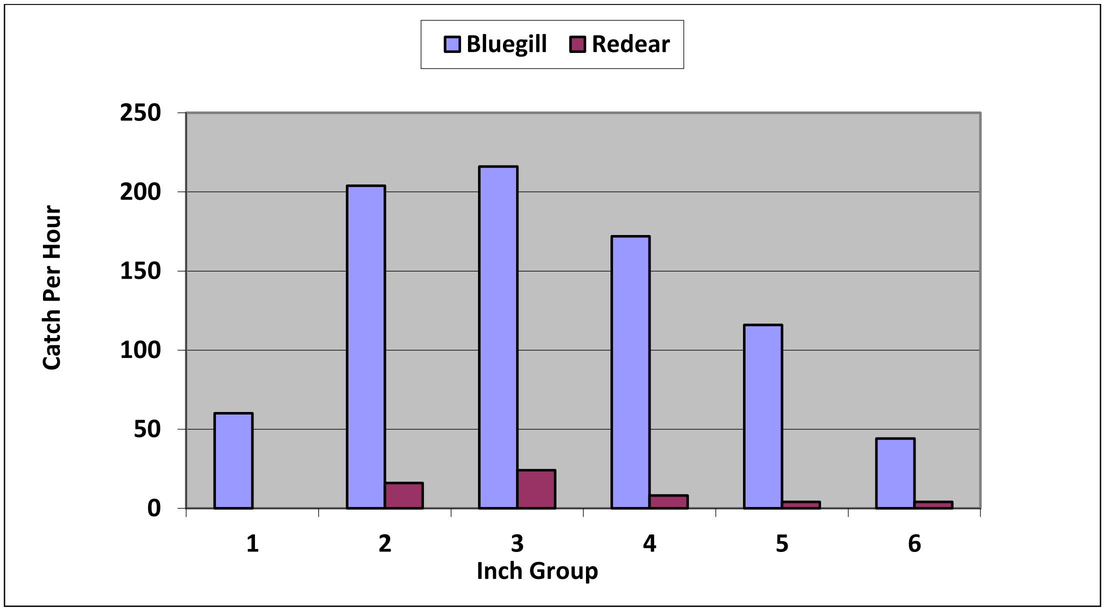

Figure 11. Size distributions of bluegill and redear sunfish collected in fall forage electrofishing samples from Bartholomew Lake, LA 2010.

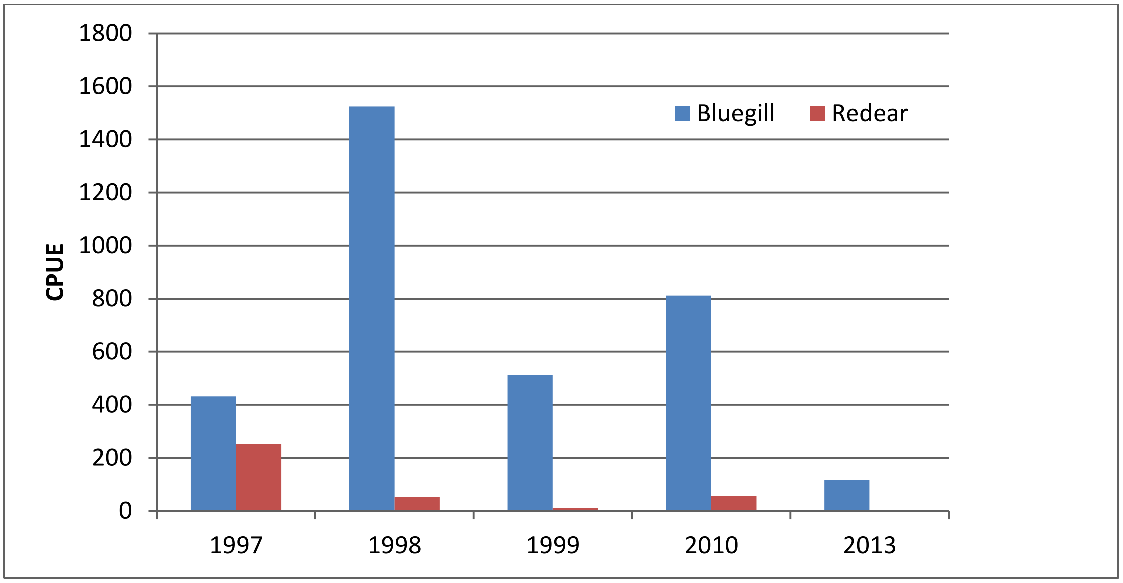

Figure 12. Catch-per-unit-effort (number per hour) of bluegill and redear sunfish collected in fall forage electrofishing samples from Bartholomew Lake, LA during 1997, 1998, 1999, 2010, and 2013.

Recreational Creel Survey

Access point creel surveys of recreational anglers were conducted in 1992 and 1995, coinciding with implementation of a protective slot limit on largemouth bass. A total of 208 and 352 interviews were conducted each year, respectively. Fishing pressure was estimated to be 41.3 hours/acre/year in 1992 and 37.8 hours/acre/year in 1995. Fishing for largemouth bass accounted for 75% and 81% of the total fishing pressure in 1992 and 1995, respectively. Bream and crappie were ranked as the second and third most sought after species, respectively. The estimated total harvest of these species is shown in Figure 13. Harvest for all three was lower in 1995. Catch per hour (CPH) estimates for bream were 3.2 and 0.9 for the two years, while bass and crappie CPH estimates were very near 0.4 for both years.

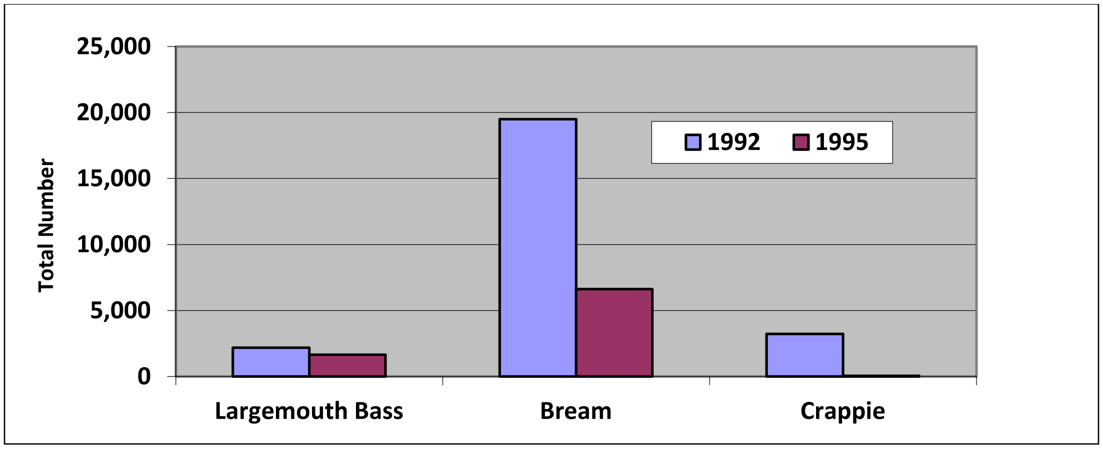

Figure 13. Estimated total harvest of largemouth bass, bream, and crappie on Bartholomew Lake, LA from the 1992 and 1995 recreational creel surveys.

The overall harvest rates for largemouth bass were 25.0% and 22.3% for the two years, respectively. Largemouth bass of legal size that were caught and released comprised 36% of the total releases in 1992 and 43% of the total releases in 1995. Of all bass caught, 47% and 45%, in 1992 and 1993 respectively, were within the protective 14 – 17 inch slot limit. Fishing pressure for bass was estimated to be 30.8 hours/acre for both years. Total harvest declined from 2,184 in 1992 to 1,646 in 1995. The percentage of fish caught within the slot limit was nearly the same for both years, yet harvest of legal size fish declined significantly. The reduced harvest of legal size bass was one of the factors that led to the removal of the protective slot limit in 2000.

Commercial

Several commercial fish species have been collected from Bartholomew Lake during biomass and gill net sampling through the years. Although commercial fishing is now prohibited, it does not appear that recent catch effort would support a viable commercial fishery. Table 1 shows the total number of selected species captured from gill net sampling in 2004, 2005, 2008, and 2012. The low abundance of predatory commercial species (catfish *Ictalurus spp.*, *Pylodictis spp.* and gar *Lepisosteus spp.*) should result in more forage, especially shad, being available for largemouth bass and crappie. The high relative weights of the largemouth bass may be indicative of the low abundance of other predators. Species not included in Table 1, but collected from prior biomass samples include black buffalo *Ictiobus niger*, bowfin *Amia calva*, common carp *Cyprinus carpio*, grass carp *Ctenopharyngodon idella*, and spotted gar *L. oculatus*. A total of six species that are considered to be commercially valuable were captured during the 2012 gill net sample, though abundance was not indicated to be high for any of them. These species included common carp, freshwater drum, bigmouth and smallmouth buffalo, and channel and flathead catfish. Figure 14 shows the total pounds per acre of commercial species taken from biomass samples conducted in 1987, 1991, 1992, and 1995. The increased catch in 1992 may be a result of an increase in forage availability or productivity in 1991, as shown above in Figure 10. In summary, commercial fish production appears to be stable, but low.

Table 1. Total number of selected commercial species captured during gill net sampling on Bartholomew Lake, LA in 2001, 2005, 2008, and 2012.

Species	2001	2005	2008	2012	Total
Bigmouth buffalo	-	2	1	1	4
Smallmouth buffalo	-	2	-	12	14
Blue catfish	-	-	12	0	12
Channel catfish	3	11	9	12	35
Flathead catfish	1	2	2	1	6
Freshwater drum	1	6	4	6	17

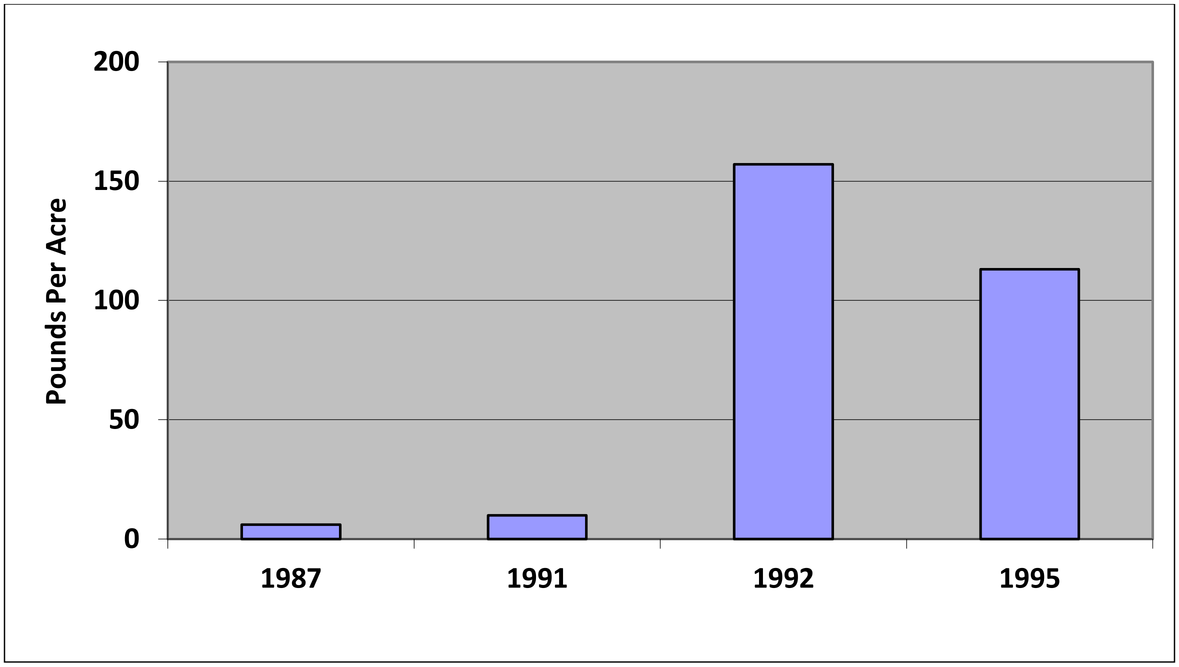

Figure 14. Estimated pounds per acre of commercial species collected from biomass samples on Bartholomew Lake, LA, in 1987, 1991, 1992, and 1995.

HABITAT EVALUATION

Aquatic Vegetation

Aquatic vegetation in Bartholomew Lake has been primarily associated with the shoreline and shallow coves. Emergent vegetation such as alligator weed (*Alternanthera philoxeroides*) and water primrose (*Ludwigia spp.*) has been the most abundant. Water hyacinth (*Eichhornia crassipes*), has been problematic in the past and has formed large mats across the entire width of the impoundment. Coontail (*Ceratophyllum demersum*), a native species, has historically been the most common submerged species. No control efforts have been necessary for coontail. The water clarity in Bartholomew Lake has typically limited growth of submerged vegetation to depths less than five feet. A qualitative assessment of vegetation in May 2011 showed there to be very little vegetation of any type on the southern half of the lake. The reason for this is unknown; however it may be associated with the pump location on the north end. Water clarity was approximately 20 inches on the south end, while it was near 30 inches on the north end. The non-native, invasive species, hydrilla (*Hydrilla verticillata*) was first documented in Lake Bartholomew in 2004 near Barrett's boat launch on the north end. Efforts were made to eradicate the newly introduced plant, but hydrilla coverage expanded to 12 acres by 2009. An effort was made to control it in late summer 2010 by applying granular Endothall® at 3.5 ppm to the entire affected area. This application failed to produce desired results, possibly because of its timing -- late in the growing season. A total of 14 acres of hydrilla was treated in spring 2011 with a 3:2 mixture of Cutrine® Plus chelated copper algaecide and diquat dibromide applied at 5 gallons per acre. This application was successful in reducing the overall coverage, though re-growth began soon after. In the summer 2014, hydrilla covered approximately 70 acres of Bartholomew Lake, completely infesting much of the shallows from Barrett's boat launch to the south highline crossing. Additional applications of herbicide have been made to the vicinity of the US Hwy 165 culvert in an effort to prevent hydrilla from infesting Bayou DeSiard.

Substrate

The natural substrate of Bartholomew Lake is mostly clay, typical of low order streams of the Ouachita River Basin. Silt has been deposited on top of the natural stream bottom from many decades of agricultural erosion. The senescence of aquatic vegetation and accumulation of leaf litter from surrounding trees has added organic material to the lake bottom. Without any significant flow or natural fluctuations of water level, these materials have most likely caused degradation of fish spawning habitat and decreased water depth in some areas. This accretion does not appear to be an imminent threat to the health of the impoundment.

Available complex cover

The most prominent forms of complex cover in Bartholomew Lake are live bald cypress (*Taxodium distichum*) trees and submerged woody material. Cypress trees are common in the shallow areas, while the woody material is found along the edge of the original creek channel. Submerged vegetation provides shallow water complex cover, with coontail and hydrilla being the dominant species. Numerous residential piers also comprise a significant component of the available cover in the waterbody.

Artificial Structure

No artificial structure has been placed into Bartholomew Lake by LDWF.

CONDITION IMBALANCE / PROBLEM

The lack of significant water level fluctuation poses the greatest threat to the fisheries habitat of Bartholomew Lake. There is no documentation of a significant drawdown on this waterbody since it was impounded in the 1930's. The degradation of the natural substrate by agricultural siltation and accumulation of organic materials may be impacting the spawning success of several species of fish. Dewatering the shallow spawning areas, thus exposing them to air, would accelerate the decomposition process and reduce organic detritus. Results would include improved water quality and increased fish spawning success.

Water fluctuation would also reduce hydrilla growth in shallow areas.

CORRECTIVE ACTION NEEDED

Bartholomew Lake could benefit from water level fluctuations to expose fish spawning areas and allow for more rapid decomposition of the organic substrate. Drawdowns of this nature would provide the additional benefit of hydrilla control.

RECOMMENDATIONS

A drawdown of the Bartholomew Lake is recommended for the following purposes: control of the hydrilla infestation, fisheries habitat improvement, and to allow homeowners an opportunity to repair piers and seawalls. An optimal drawdown would lower the lake level to a depth five feet below pool stage, beginning Sept. 1 and continuing for a minimum of 3 months. Dewatering rate should not exceed 4 inches per day.

The drawdown recommendation as described above is submitted as the preferred management recommendation. However, if the extent and timing of the recommended drawdown are not compatible with Monroe Municipal Water Supply needs, LDWF staff will remain available for consideration of alternative water fluctuation that is compatible.

Grass Carp: A total of 750 grass carp were stocked in April 2013. Grass carp survival and vegetation consumption will be evaluated for the next 5 years. Grass carp condition and abundance will be evaluated from samples collected by gill net sampling.

Herbicide Applications: Treatments in the vicinity of the Lake Bartholomew – Bayou DeSiard control structure will continue as an effort to prevent the spread of hydrilla into Bayou DeSiard. Diquat dibromide (2 gallons per acre) will be applied every 60 days until treatments are determined to be unnecessary. Similar applications will also be conducted at other public boat launches as needed.

Herbicides that require extended exposure to vegetation at a designated concentration (Ex. Fluridone or penoxsulam) are not applicable for this situation. Continuous pumping for municipal water needs creates inadequate water retention time.

Type map surveys should be conducted annually for a period of five years to evaluate the status of aquatic vegetation.

Emergent and Floating Species: will be treated on an as-needed basis based on observations by LDWF personnel and complaints from the general public.

Water Hyacinth and American Lotus will be treated as follows:

March 15 – Sept. 15 – glyphosate (0.75 gallons/acre) with Surfac 910 surfactant (0.25gal/acre)

Sept. 16 – March 14 – 2,4-D (0.5 gallons/acre) with Surfac 910 (1 pt/acre)

Other Emergent species will be treated as follows.

Residential areas - imazamox (0.5 gal/acre) with Turbulence surfactant (0.25 gal/acre)

Undeveloped areas - imazapyr (0.5 gal/acre) with Turbulence surfactant (0.25 gal/acre)